Moving towards an Ecosystem Based Management in the Gulf of Cadiz

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1. Definitions

Ecosystem Based Management (EBM) is the framework currently used for restoration of marine ecosystems. It is an environmental management approach that recognizes the full array of interactions within an ecosystem. EMB differs from conventional resource management in that it defines strategies for entire systems, not simply individual components of the ecosystem.

Integrate Ecosystem Assessments (IEA) is a synthesis and quantitative analysis of information on relevant physical, chemical, ecological and human processes in relation to specified ecosystem management objectives. IEAs are a critical science support element enabling an EBM strategy.

2. Tool: Levin Cycle

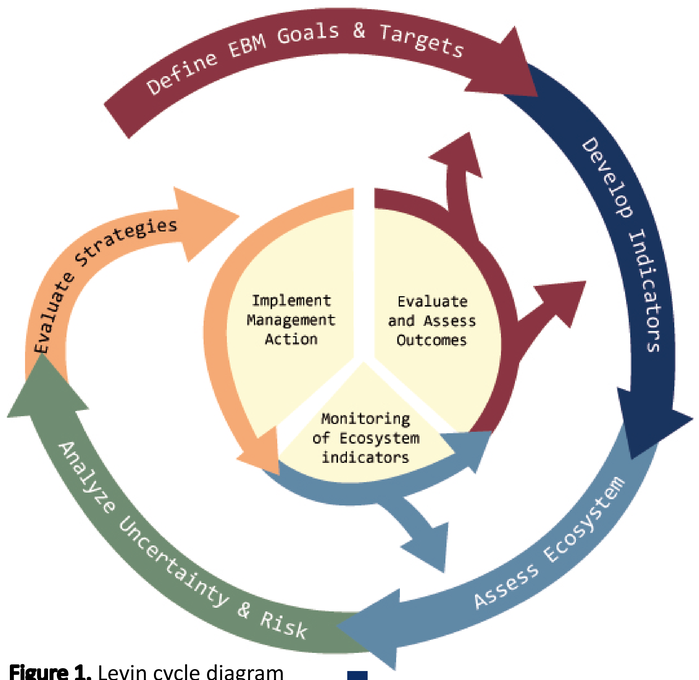

Figure 1. Levin cycle diagram (Levin et al 2009)

3. Study Area: Gulf of Cadiz

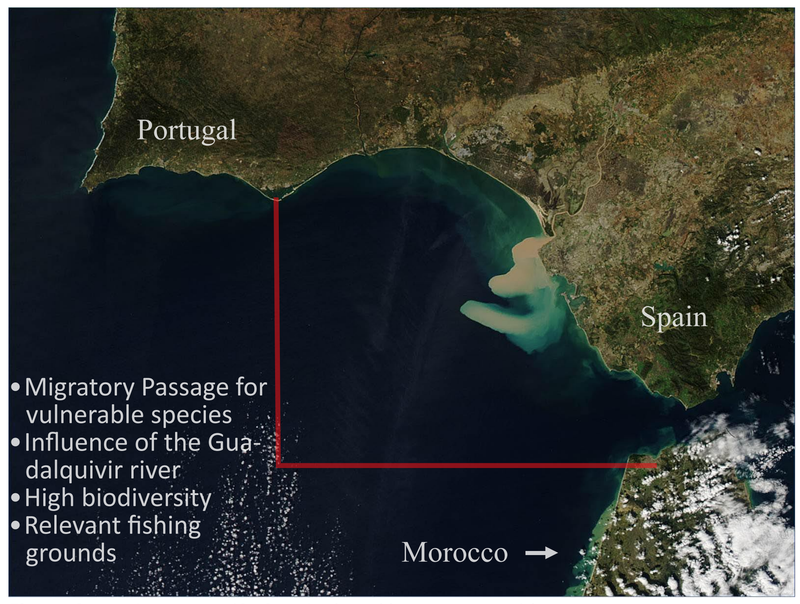

Figure 2. Study area Gulf of Cadiz (GoC)(ICES IXa South)

4. Available Information:

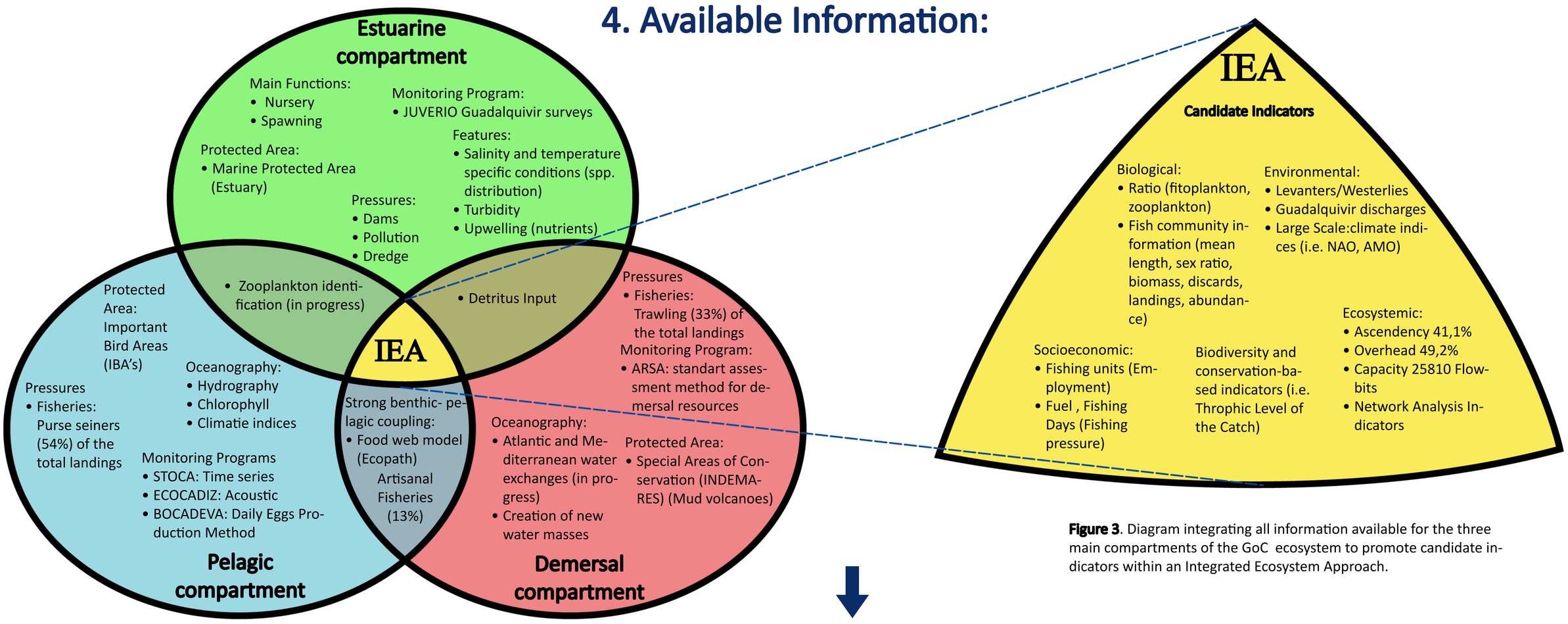

Figure 3. Diagram integrating all information available for the three main compartments of the GoC ecosystem to promote candidate indicators within an Integrated Ecosystem Approach.

5. Results:

Food Web Model

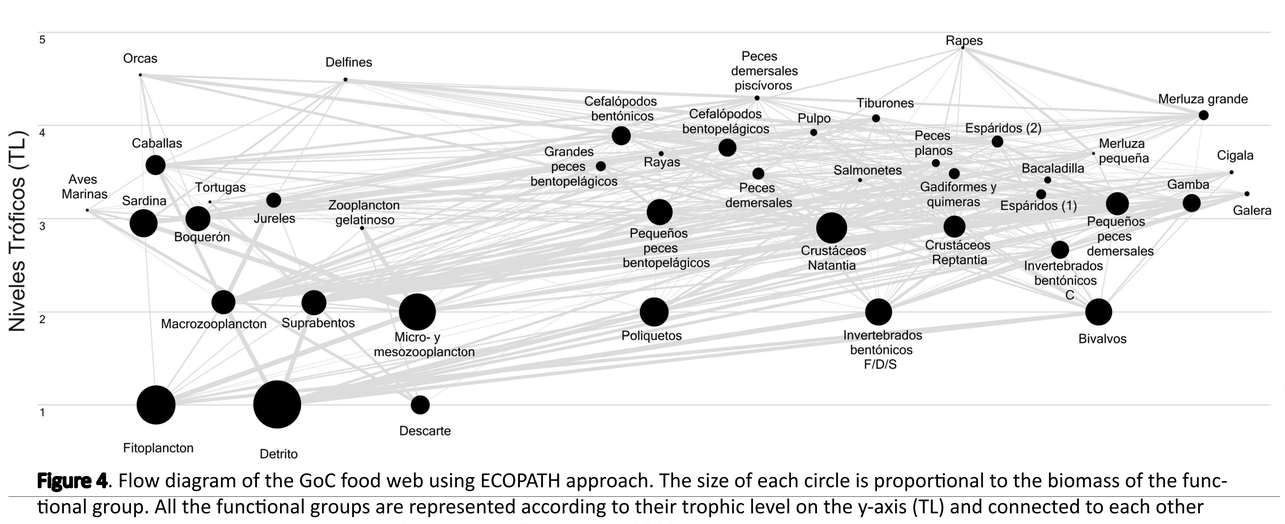

Figure 4. Flow diagram of the GoC food web using ECOPATH approach. The size of each circle is proportional to the biomass of the functional group. All the functional groups are represented according to their trophic level on the y-axis (TL) and connected to each other through lines representing prey-predator interactions. Torres et al. (2013).

Traffic Plots Analysis

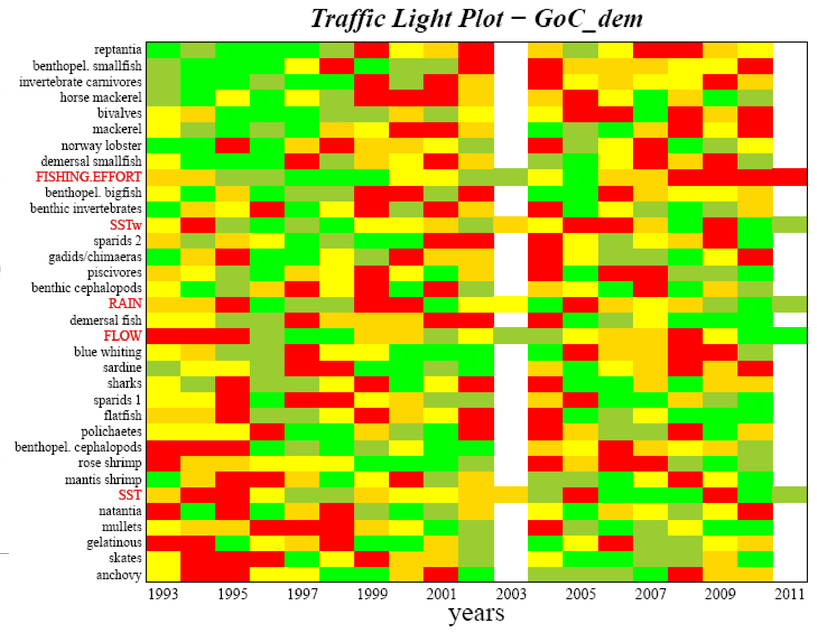

Figure 5. Traffic-light plot representing the development of the GoC demersal ecosystem over the last couple of decades. Trophic levels/ functional groups are labeled in black whereas environmental variables and fishing effort are in red. Time-series were transformed into quintiles and sorted according to PC1; red represents high values while green represents low values of the respective variable. ICES (2013).

6.Future Research:

1. Ecopath limitations
   - Lack of information for invertebrates and vulnerable groups.
   - Major sources of uncertainty associated with the biomass estimations.
   - Better estimations of the total catch for all functional groups are needed.
2. Fields to develop
   - Zooplankton research
   - Water masses exchange research
   - Detritus better estimation
3. European perspective / ICES Recommendations
   - See Dickey-Collas (2014)

References

Torres, M.A.et al. (2013) Food-web structure of and fishing impacts on the Gulf of Cadiz ecosystem (South-western Spain). Ecol. Model. 265, 26–44.
Levin, P. S. et al. (2009) Integrated Ecosystem Assessments: Developing the Scientific Basis for Ecosystem-Based Management of the Ocean, *Plos Bio* 7, 23-26.
Dickey-Collas, M. (2014) Why the complex nature of integrates ecosystem assessments requires a flexible and adaptive approach, ICES J.Mar. Sci.
ICES 2013 Report of the Working Group on Ecosystem Assessment of Western European Shelf Seas (WGEAWESS)
http://www.noaa.gov/iea/

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